[600.1233div; A3744; HEM02/610]

MAGNETIC TUCKER BAR FOR A PRINTING PRESS

BACKGROUND OF THE INVENTION

[0001] The present invention relates generally to printing presses and more particularly to a tucker bar for tucking an edge of a plate into a plate cylinder of a printing press.

[0002] U.S. Patent No. 5,678,487 discloses an apparatus for mounting printing plates into an axially-extending gap in a plate cylinder. A tucking device has a plurality of tucking elements arranged along the width of the plate cylinder and its axially extending gap. Each of the tucking elements is driven by pistons, so that a plurality of pistons extend along the width of the tucking device. The '487 patent is hereby incorporated by reference herein.

[0003] German Patent Application Nos. 100 01 324 and 100 01 328 disclose a device for pulling flexible printing plates onto a plate cylinder using a pressure roller. In the '324 application, the pressure on an edge of the printing plate is less than in the middle, while in the '328 application the pressure roller has a camber and is activated by adjustable pressure forces.

[0004] U.S. Patent No. 4,890,553 discloses a positioning and attachment means for flexible printing plates on a plate cylinder. Register pins and a permanent bar magnet are mounted to the plate cylinder. The bar magnet is located inside the plate and is advanced to hold a leading edge of the plate. A stationary bar magnet can hold the trailing edge.

[0005] U.S. Patent No. 6,062,140 discloses a magnetic plate cylinder having permanent bar magnets at a circumference of the plate cylinder for holding the

printing plate on the plate cylinder.

[0006] Japanese Patent Application No. 2001-253051 discloses a printing plate having a permanent magnetic layer for fastening the plate to the plate cylinder.

BRIEF SUMMARY OF THE INVENTION

[0007] A problem associated with present tucking devices is that a large number of pistons or air cylinders are needed across the width of the tucking device to properly tuck the tail of the plate into the slot of the plate cylinder.

[0008] An object of the present invention is to provide a simplified tucking device. Another alternate or additional object of the present invention is to provide a tucking device with fewer moving parts. Yet a further alternate or additional object of the present invention is to improve access inside a print unit of a printing press having a tucking device.

[0009] The present invention provides a tucking device for tucking a printing plate into a gap of a plate cylinder comprising:

[0010] a tucker bar, the tucker bar having a tucking surface and at least one magnet for creating a repulsive magnetic force at the tucking surface; and

[0011] an actuator connected to the tucker bar for moving the tucker bar.

[0012] By having a magnet on the tucker bar creating a repulsive force away from the tucker bar, the magnetic force can aid in the tucking motion, and moving parts can be reduced.

[0013] Preferably, the actuator includes a first cylinder at one end of the tucker bar, and a second cylinder at another end of the tucker bar, with the magnet being located between the first cylinder and the second cylinder.

[0014] The first and second cylinders may be held by brackets attached to a frame of the printing press.

[0015] Alternately, the actuator may include handles for an operator to hold and control the tucker bar.

[0016] The magnets may be electrically-activated or permanent.

[0017] The present invention also provides a method for attaching a printing plate having a first side and a second side to a plate cylinder comprising the steps of:

[0018] attaching a first edge of the printing plate in a gap of the plate cylinder;

[0019] placing the printing plate on the plate cylinder so that the first side of the printing plate lies on an outer circumferential surface of the plate cylinder; and

[0020] tucking a second edge of the printing plate into the gap or another gap of the plate cylinder using a repulsive magnetic force against the second side of the printing plate.

[0021] The placing of the printing plate may occur for example through rotation of the plate cylinder.

[0022] Preferably, the tucking also includes forcing the second side of the printing plate using a tucker bar contacting the second side.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] Fig. 1 shows a preferred embodiment of the tucking device of the present invention;

[0024] Fig. 2 shows an alternate embodiment of the tucking device of the present invention; and

[0025] Fig. 3 shows a cross-sectional view of the tucking device tucking a printing plate into a gap of a plate cylinder.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] Fig. 1 shows a first embodiment of a tucking device 10 according to the present invention. Tucking device 10 includes a tucker bar 30 connected at one end 32 to a piston 16 of an air cylinder 14, and at the other end 34 to a piston 116 of an air cylinder 114. Air cylinder 14 is connected to a work side frame 60 of a printing press by a fixed bracket 12, and air cylinder 114 is connected to a gear side frame 62 of the printing press via a fixed bracket 112.

[0027] Air cylinders 14, 114 are driven in tandem by a controller 40, which can actuate bar 30 in direction D towards a plate cylinder 70. Plate cylinder 70 is rotatable with respect to frames 60, 62.

[0028] Magnets 20, 22, 24, which may be for example permanent or electrically-activated magnets, are located between the ends 32, 34 of the bar 30, and create a magnetic repulsive force F normal to the lower or tucking surface 36 of the tucker bar 30.

[0029] The magnetic force added to the force created by the air cylinders provides an improved tucker bar. The magnetic force results in less force being required by the air cylinders, and a reduced stiffness requirement for the tucker bar. Smaller or fewer moving parts are required for the tucking device, so that access to the printing unit also can be improved.

[0030] Fig. 2 shows an alternate embodiment with an operator-held tucking device 110. Tucker bar 130 with repulsive force magnets 120, 122, 124 has two handles 136, 138. An operator thus can grip the tucking device at handles 136, 138 and use the bar to tuck a printing plate manually.

[0031] Fig. 3 shows a cross-section of tucker bar 30 of tucking device 10 tucking a printing plate 72 onto plate cylinder 70. Plate cylinder 70 may be part of an offset lithographic printing press having a blanket cylinder 80 for printing a web 90.

[0032] A lead edge 76 of printing plate 72 first is tucked into a gap 73 in the outer circumference 79 of plate cylinder 70. Plate cylinder 70 is then rotated so that an inner side 82 of printing plate 72 contacts outer surface 79. Trail edge 78 of printing plate 72 thus lines up with gap 73. Tucker bar 30 tucks the trail edge 78 into gap 73 using physical and repulsive magnetic forces acting on an outer side 84 of plate 72. A lock-up device 74 then secures both edges 76, 78 to the plate cylinder 70.

[0033] While the use of a one-around plate cylinder is shown, the tucker bar 30 could be used to tuck the trail edge 78 into another gap on the plate cylinder, for example, when a two-or-more around plate cylinder is used.